X-ray Properties of the Broad Absorption Line QSOs & Cataclysmic Variables from the Extended Medium Sensitivity Survey

Final Technical Report

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The grant period started 9.15.91, initially for 1 year. It was extended for an extra year, to end 9.14.93. Since the termination of the grant, the PI has moved twice, initially to the Institute of Astronomy, Cambridge University, and then the the Dominion Astrophysical Observatory. My current mailing address is:

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ROSAT observations of the LMXB system MS1603.6+2600 were taken on the 26th of August 1991. The data was received in Pasadena on the 15th of April 1992. The target was clearly detected, with 680 counts detected in 25805 seconds. Preliminary analysis of the data using the PROS software package show that there is a clear eclipse in the X-ray light curve, when binned with the optical period. Some spectral fitting has been attempted. Single component models did not provide an adequate fit to the data. Work on 2 component fits is in progress. Largly because of the 2 moves by the PI in the last year and a half, a paper describing these results is still in preparation.

Observations of the Broad Absorption Line Quasar 0226-1024 were taken on the 2nd of April 1992, and received July 10. Surprisingly, the Quasar was not detected in the 9000 second exposure. We have investigated the aspect solution, and no obvious error seems to have occurred. We believe this means that a large amount of intrinsic absorption is present, possible due to the BAL material. Further work setting limits on the amount of absorption required is in progress. A proposal with Paul Greeen as PI has been submitted to ASCA to observe the BAL 2212-1759, which *was* detected by ROSAT. During the grant period a number of papers were submitted on BAL QSO properties, although publication of the ROSAT X-ray results is still in preparation.

I enclose below a bibliography of papers submitted during the grant period, with '***' marking ones directly relating the grant subject.

1. J. P. Henry, I. M. Gioia, T. Maccacaro, **S. L. Morris**, J. T. Stocke and A. Wolter, 1992, ApJ, 386, 408, "The EMSS distant cluster sample: X-ray data and interpretation of the luminosity evolution".

2. R. L. Gilliland, **S. L. Morris**, R. J. Weymann, D. C. Ebbets and D. J. Lindler, 1992, PASP, 104, 367, "Resolution and noise properties of the Goddard High-Resolution Spectrograph".

3. K. L. Visnovsky, C. D. Impey, C. B. Foltz, P. C. Hewett, R. J. Weymann, and **S. L. Morris**, 1992, ApJ, 391, 560, "Radio properties of optically-selected QSOs".

4. *** J. T. Stocke, **S. L. Morris**, R. J. Weymann and C. B. Foltz, 1992, ApJ, 396, 487, "The Radio properties of BALQSOs".

5. *** T. A. Barlow, V. T. Junkkarinen, E. M. Burbidge, R. J. Weymann, **S. L. Morris**, K. T. Korista, 1992, ApJ, 397, 81, "Broad Absorption Line Time Variability in the QSO CSO 203"

6. *** K. T. Korista, R. J. Weymann, **S. L. Morris**, M. Kopko Jr., D. A. Turnshek, G. F. Hartig, C. B. Foltz, E, M. Burbidge and V. T. Junkkarinen, 1993, ApJ, 401, 529, "HST-FOS and ground-based observations of the broad absorption line quasar 0226-1024"

7. B. D. Savage, L. Lu, R. J, Weymann, **S. L. Morris** and R. L. Gilliland, 1993, ApJ, 404, 124, "Observations of the Gaseous Galactic Halo towards 3C273 with the Goddard High Resolution Spectrograph"

8. J. C. Brandt *et al.* (19 authors including **S. L. Morris**) 1993, AJ, 105, 831 "Observations of 3C273 with the Goddard High Resolution Spectrograph on the Hubble Space Telescope"

9. *** K. T. Korista, G. M. Voit, **S. L. Morris** and R. J. Weymann,1993, ApJs, 88, 357, "Double Troughs in Broad Absorption Line Quasars and Lyα-NV Line Locking"

10. *** F. Hamann, R. J. Weymann, K. Korista, and **S. L. Morris**, 1993, ApJ, 415, 541, "On the Geometry, Covering Factor and Scattering-Emission Properties of QSO Broad Absorption Line Regions"

11. **S. L. Morris**, R. J. Weymann, Alan Dressler, P. J. McCarthy, B. A. Smith, R. J. Terrile, R. Giovanelli and M. Irwin, 1993, ApJ, 419, 524, "The Environment of Lyman α Absorbers in the Sightline towards 3C273"

12. B. M. Peterson *et al.* (43 authors including **S. L. Morris**), 1994, ApJ, 425, 622, "Steps towards determination of the size and structure of the broad-line region in active galactic nuclei. VII Variability of the optical spectrum of NGC 5548 over four years"